Space Weather Forecast

Issued on Tuesday, 25 July 2023 at 01:30 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance R1/R2 blackouts throughout. Chance of G1 Minor geomagnetic storms late day 2 and day 3 (26th/27th July).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Low, with only peak common class flares observed. The largest of these were from a region in the northwest that is becoming harder to see and another region that is now over the northwest horizon. A similar sized common class flare was observed from the large sunspot in the north-centre disc, although this is now considered to be three separate regions. The two main regions of interest are a region near the southeast limb, that is still rotating into view and another small region in the northwest. Both of these have seen the emergence of a number of smaller spots around their largest main spot.

No Earth-directed CMEs (coronal mass ejections) were observed in the last 24 hours, however there were two events of interest. The common class flare from the central disc sunspot mentioned above resulted in a faint and weak CME, however this has been modelled as missing behind Earth. A very fast far-sided eruption was then visible in imagery from 24/1800 UTC.

Solar Wind / Geomagnetic Activity: Observations of the solar wind are indicative of a weak connection to the fast wind from a coronal hole. Solar wind speeds varied from background to slightly elevated at 350-450km/s. Interplanetary magnetic field was weak and steady with the north-south component also weak and variable. Geomagnetic activity was Quiet to Unsettled (Kp 1-3).

Energetic Particles / Solar Radiation: The observed count rate of high energy particles (high energy protons) increased in response to the far-sided large event. This approached, but did not exceed the S1 Minor Radiation Storm threshold, peaking at 24/2055 UTC, before erratically and very slowly easing.

Four-Day Space Weather Forecast Summary

Solar Activity: Low to Moderate activity is expected, with a chance of isolated Moderate class flares.

Solar Wind / Geomagnetic Activity: A CME from 23 Jul may give a glancing impact either late day 2 or early day 3 (26-27 Jul). Otherwise current slightly elevated solar winds are expected to persist. A further weak coronal hole sourced fast wind may arrive later on day 3 (27 Jul) or day 4 (28 Jul) however this is low confidence. Mainly Quiet geomagnetic activity is expected at first, with a chance of isolated Unsettled to Active intervals. This increasing to give a period Unsettled to Active, with a chance of G1 Minor storms with any CME arrival, either late day 2 or early day 3 (26-27 Jul) and a slight chance with any further HSS enhancement later day 3 or 4 (27-28 Jul).

Energetic Particles / Solar Radiation: The count rate of energetic particles is expected to continue declining towards background, with any further events from the far-side increasingly unlikely to cause further enhancements. Observed count rates may briefly increase ahead of any CME arrival however, and there remains a slight chance of the observed count rate increasing from any significant flares that occur. Despite this, Solar Radiation storms are currently not

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expected.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	30	30	10
Strong	G3	No	1	2	2	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	60	60	40	30
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	20	10	5	5
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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